

REMARKS

As noted above, the present response is responsive to a final Office Action mailed October 14, 2004. That Office Action was marked due January 14, 2005. A three-month Extension of Time, along with a Request for Continued Examination (RCE) and a Response to the outstanding Office Action were timely submitted on April 14, 2005; the three-month Extension of Time extending the period for response to the outstanding Office Action to April 14, 2005. On April 29, 2005, a Notice of Non-Compliant Amendment was mailed in Response to the prior Response mailed April 14, 2005. In view of the timely submission of the RCE, the present Response is believed to be a Preliminary Amendment modified to address the issues raised in the Notice of Non-Compliant Amendment. In view of the foregoing it is respectfully submitted that the present response is timely given the request for three-month Extension of Time and the Request for Continued Examination filed April 14, 2005 and in view of the one-month period for response to the Notice Non-Compliant Amendment mailed April 29, 2005.

As noted above, the claims of all prior versions have now been amended to include the claims listed in the claim section above. In this section, claims 92, 115, 119, 122 and 128 have been amended and claim 98 is cancelled. Claims 92, 115, 119, 122 and 128 having been amended and claim 98 being cancelled, the claims now pending in the present application are claims 92-97, 101-115 and 119-135.

On pages 2-4 of the outstanding Office Action the Examiner has noted that certain claim objections and claim rejections from the prior Office Action have been

withdrawn in view of prior amendments. The Examiner's acknowledgment in this regard is noted with appreciation.

On page 4 of the Office Action the Examiner has requested a complete reply to the final rejection including a cancellation of non elected claims or other appropriate action. In this regard, it is respectfully noted that the Applicant believes claims 1-91 were effectively withdrawn from the application in a response submitted February 12, 2004. Insofar as claims 1-91 have not been previously withdrawn, the Applicant respectfully cancels claims 1-91 at this time as claims drawn to a non-elected invention. The Applicant respectfully reserves the right to pursue these and other similar claims in a subsequent application claiming priority to the present application.

Also on page 4 of the Office Action, the Examiner has objected to a section in the specification. This section has now been amended and it is respectfully submitted that it is believed the Examiner's objection is now moot.

In addition, the Examiner has objected to claim 119 due to certain informalities. These informalities have been corrected in the present amendment and it is believed this objection is now moot.

On pages 5 and 6 of the Office Action claims 92-98, 101-114, 122-127, 132 and 134 are rejected under 35 USC §112, second paragraph, due to additional informalities noted by the Examiner in claims 92, 122, 124, 132 and 134. Amendments to the claims have been made to address these informalities. In view of the amendments, insofar as the Section 112 rejections may be maintained with respect to the amended claims, reconsideration and withdraw are respectfully requested.

On page 6, claims 92, 95-96, 98, 101, 103, 107 and 111-114 are rejected under

35 USC §102(b) as being anticipated by Cates et al. (U.S. Patent No. 5,512,123).

In response, amendments have now been made to the claims to clarify the invention by including a recitation to electromagnetic radiation in the active zone including continuous ultraviolet radiation of a certain wavelength which resides within the ultraviolet radiation range. Support for these amendments may be found in the specification on page 10 at lines 3-5. It will be appreciated that Cates et al. do not disclose the use of continuous or "constant" exposure to UV radiation by rather intermittent exposure of the kind provided by pulsed or "flash" radiation of the type disclosed by Cates et al. Furthermore, this radiation is specified to be broadband radiation which has negative effects that will be discussed below.

As noted in Cates et al. in the Summary Of The Invention, Cates et al. describes a method in which a target area is irradiated with "pulsed, incoherent optical energy having wavelength components which range from 160-5,000 nanometers at an intensity sufficient to photo decompose any adventitious organic substances on the surface and to photo decompose a thin layer of molecular bonds forming the surface of the structure...." (See column 3, lines 14-19, 27-31, 41-47, 56-62, etc.)

Furthermore, however, Cates et al. teach against using continuous ultraviolet radiation in relation to the task Cates et al. have undertaken by referencing Sowell et al. ("Surface Cleaning By Ultraviolet Radiation", J. Vac. Sci., Vol. 11, No. 1, January/February 1974"), a copy of which is attached for the Examiner's convenience and submitted herewith as a prior art reference for the present application.

At Column 2, lines 1-17 of the '123 patent, Cates et al. note that the Sowell reference describes a process for removing hydrocarbon contaminates from metal and

glass by irradiating such surfaces with "steady-state" ultraviolet radiation, or what is also known in the industry as continuous radiation. Applicant notes here, however, that Sowell describes only the removal of contaminates from metal and glass by irradiating such surfaces with "generally steady-state" UV radiation. It is respectfully noted that Sowell does not describe the use or application of continuous UV radiation to surfaces to achieve surface chemical modification.

Nevertheless Cates et al. continue indicating that:

"However, the process described by Sowell requires hours to complete due to the limited UV light intensity that can be obtained from a steady-state UV light source. Therefore, the Sowell process is generally not suitable for applications in which it is desirable to increase the bondability of surfaces, some of which may be very large, within a period of time which would make such processing practical." (emphasis added)

It will be appreciated, given this disclosure by Cates et al., that Cates et al. teaches against the use of continuous or steady-state UV radiation which Cates et al. assert to be not suitable "for applications in which it is desirable to increase the bondability of surfaces".

For this reason, Applicant respectfully submits that Cates et al. do not appreciate the value of using a continuous electromagnetic source. In fact, the Applicant has now discovered and demonstrated that, just opposite of the teachings of Cates et. al., surface chemical modifications can be achieved very efficiently with continuous UV radiation which results in significant increase in the bondability of surfaces.

Furthermore, Applicant respectfully submits that the pulsed use of a broadband of radiation as used by Cates et al. (e.g. from 160 to 5,000 nanometers) is less effective for use in the present application because the visible and infrared portions of this

radiation will inappropriately and is indiscriminately heat the substrate, when such heating is unwanted. It is respectfully submitted that it is well known that the inherent nature of incoherent, pulsed optical energy apparatuses (commonly known in the industry as flash lamps) generate only broadband energy spectrum which indeed range from the UV well into the infrared spectrum (800nm to 5000nm). The difficulty (or problematic issue) with using flash lamps is that the surfaces of the substrates are heated to a relatively high temperature, particularly by radiation above 400 nm. This excess heat can cause physical deformation of the surfaces of polymeric articles rendering them non-useful. Furthermore, it is well known that excess heat on chemically modified surfaces will cause the functional groups created on the surface to rotate into the polymer bulk, thus decreasing the activity of the surface and result in a less bondable surface. However, by limiting the wavelength of surface exposure to only UV (400 nm and below) these problems are avoided.

This is substantiated by Drzal et al. (U.S. Patent No. 6,676,762; a copy of which is provided herewith), which indicates at Column 2, lines 4-8 (See also Col. 1, line 60-Col. 2, line 44) that, "the problem with the Cates et al. process is that the surface of the substrate is heated to a relatively high temperature, particularly by radiation above 500 nanometers and relatively long treatment times.

While the Applicant does, in certain cases, occasionally apply infrared radiation to the substrate, in addition to the continuous UV radiation recited in the present claims, for the purpose of heating the substrate to a limited degree to achieve certain application parameters, as noted above, it is believed that the indiscriminate application of pulsed radiation of the broad band type that is disclosed by Cates et al. will overheat

polymeric substrates in such a manner that the substrates will be of limited commercial use.

Furthermore, the cost of providing a system in which pulsed energy in this broadband range of radiation is believed to be significantly more expensive than the system provided by the Applicant in which a continuous ultraviolet radiation is directed to the substrate. In the Applicant's system, expensive equipment such a capacitors, that would be needed to enable the system to pulse the radiation, are not required.

Finally, Cates et al. states "The method of the present invention involves irradiating a target area of the surface of interest with pulsed, broadband optical energy, which is preferably incoherent, while exposing the target area with an ionized gas." Column 4, lines 51-54. Due to the inefficiencies of the flash lamp system alone, Cates et.al. requires that additionally ionized gas be deployed to ultimately achieve satisfactory surface modification. As noted above, however, the Applicant has discovered and demonstrated that surface chemical modifications can be achieved very efficiently with continuous UV radiation which results in significant increase in the bondability of surfaces, without exposing the target area with an ionized gas and in a way from which Cates et al. specifically teach away.

In view of the foregoing it is respectfully submitted that the present invention is distinguished from the system and the methods disclosed by Cates et al. For that reason, insofar as the present rejections may be maintained with respect to the claims referenced immediately above, reconsideration and withdraw are respectfully requested.

On page 9 of the present Office Action, claims 128 and 130 are rejected similarly

as being anticipated by Cates et al. In view of the amendments to independent claim 128, and for the reasons noted above, it is respectfully submitted that these claims are also distinguished from the method disclosed by Cates et al. In view of the foregoing, and for the reasons noted above, insofar as the present rejections may be maintained with respect to present claims 128-130, reconsideration and withdrawal are respectfully requested.

On pages 10 and 11, claims 93-94, 97, 102 and 104-106 are rejected under 35 USC Section 103(a) as being unpatentable under Cates et al. as applied to the prior claims; and on page 13, claims 108-110 are rejected under 35 USC Section 103(a) as being unpatentable under Cates et al. as applied to the prior claims, in further view of Elliott et al. (U.S. Patent No. 5,669,979); and on page 14, claims 115, 119 and 120 are rejected under 35 USC §103(a) as being unpatentable under Cates et al.; and on page 16, claims 121-123 are rejected under 35 USC Section 103(a) as being unpatentable over Cates et al.; and on page 19, claims 124-127 are rejected under 35 USC Section 103(a) as being unpatentable over Cates et al. as applied to claims 121-123 above, and further in view of Elliott et al.; and on page 20, claims 131-135 are rejected under 35 USC Section 103(a) as being unpatentable over Cates et al. as applied to claims 128-130 above, and further in view of Elliott et al.

In response to each of these rejections, it is respectfully submitted that the claims, as presently clarified, are directed toward a system and methods employing continuous UV radiation not disclosed by Cates et al. In view of the prior arguments in this regard, it is respectfully submitted that the present claims are distinguished over Cates et al., whether combined with Elliott et al. or otherwise. Therefore, in view of the

foregoing, insofar as any of the aforementioned rejections may be maintained with respect to the present claims; reconsideration and withdraw are respectfully requested.

As noted above, a request for a three-month Extension of Time to respond to the outstanding Office Action mailed October 14, 2004 is hereby submitted, thereby extending the period for response to the outstanding Office Action to April 14, 2005.

Also submitted herewith are a Request for Continued Examination and authorization to charge the appropriate fees for same to the undersigned Attorneys Deposit Account.

If any further payment is required to make the present response timely, please charge it to the Deposit Account No. 13-4300. Thank you.

In addition, a Supplemental Information Disclosure Statement was submitted with the previously submitted Response requesting consideration of the list references. Consideration will be appreciated. Thank you.

In further view of the foregoing, it is respectfully submitted that the present application is now in condition for allowance. Notification to that effect is earnestly solicited.

The Examiner is respectfully urged to contact the undersigned attorney if there are any further matters standing in the way of allowance of the above-identified application and it is believed by the Examiner that these matters can be addressed and resolved in a telephone conference and thereby speed the conclusion of the present prosecution. The Examiner's consideration in this regard will be appreciated.

Respectfully submitted,

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